

SPECIFICATION AMENDMENTS

Kindly amend the original filed specification as follows, and add the appended Abstract as a new page following the new claims provided below.

Please replace the paragraph/section beginning at page 1, line 5, with the following rewritten paragraph:

The present invention relates to a ~~diode~~ DPSS laser, and more particularly to a green ~~diode~~ DPSS laser a volume and a weight thereof are significantly reduced with respect to conventional ones.

Please replace the paragraph/section beginning at page 1, line 14, with the following rewritten paragraph:

A typical green DPSS laser 9 is as schematically shown in Figs. ~~1a~~ 1A and ~~1b~~ 1B. The green DPSS laser consists of a laser diode (LD) ~~assembly 102 having~~ that comprises a case LD casing ~~109~~ 101, a heat sink mounted within LD casing 101, ~~containing a pump diode~~ a semiconductor chip 102. ~~The pump diode 102, powered by a driver circuit providing current therefor, is attached to~~ mounted on a the heat sink ~~101 part of which is also contained in the case 109.~~ The pump diode 102 is an infrared (IR) laser diode emitting at 808 nanometer (nm). Laser beam produced by the pump diode 102 passes through and an output window, defined in the case 109 and a microlens covering on the window which emitting a pumping radiation for exciting a lasing medium, a lens system 103 mounted within a casing 106 for focusing of the pumping radiation, and ~~An~~ an optical resonant cavity is ~~provided in the path of the laser beam~~ mounted within a cavity casing 108, ~~having~~ including a lasing medium 104 for a light amplification of 1064nm in wavelength and an intracavity frequency doubler 105 for converting 1064nm to 532nm in wavelength, either departing with each other or ~~optically glued~~ being combined together. The LD casing 101, the lens system casing 106 and the cavity casing 108 are sealed in the casing 109. If the lasing medium 104 and the intracavity frequency doubler 105 are ~~optically glued~~ combined together, an anti-reflection coating at 808 nm (AR@808) and a high-reflection coating at 532 (HR@532) nm and 1064nm (HR@1064

nm) are applied to an input facet facing the ~~pump~~ laser diode light, and an HR coating @1064nm and an AR coating @532nm are applied to an output facet opposite to the input facet. When the lasing medium 104 and the intracavity frequency doubler 105 are discrete, an AR coating @808nm and an HR coating @1064nm and 532nm are applied to the input facet of the lasing medium 104, and an AR coating @1064nm and 532nm to an output facet of the lasing medium 104 opposite to the input facet thereof; while an AR coating @1064nm and an AR@532nm to an input facet of the intracavity frequency doubler 105 facing the output facet of the lasing medium 104, and an HR coating @1064nm and an AR coating @532nm to an output facet of the intracavity frequency doubler 105 opposite to the input facet thereof.

Please replace the paragraph/section beginning at page 2, line 7, with the following rewritten paragraph:

The lasing medium 104 can be, most often, Nd:YAG or Nd:YVO₄, or another crystal ~~that amplifies the input light that passes through it~~. The intracavity frequency doubler 105 is usually KTP, KDP, LBO, BBO, ADP, LiIO₃, or another non-linear material that is able to efficiently produce an output that is twice the frequency of the signal applied to its input.

Please replace the paragraph/section beginning at page 2, line 15, with the following rewritten paragraph:

An infrared (IR) blocking filter is provided in the path of the laser beam for removing the unwanted IR rays while providing excellent transmission for green wavelength. Optically, ~~an electro-optic crystal (also known as a Q-switch, 94) and/or~~ or a single mode device can also be inserted ~~between~~ in the optical resonant cavity (93) ~~and the IR blocking filter respectively for making the laser into a pulse laser and/or~~ or a single longitudinal mode laser.

Please replace the paragraph/section beginning at page 2, line 21, with the following rewritten paragraph:

A photodiode is attached in the ~~case~~ LD casing of the laser diode ~~assembly for~~ receiving and sensing ~~a reflected laser from the microlens~~ laser diode-generated pumping

radiation and thus establishing a negative feedback for controlling the optical power output by the pump diode.

/A photodiode is attached in the LD casing of the laser diode for receiving and sensing laser diode-generated pumping radiation and thus establishing a negative feedback for controlling the optical power output of ~~pumping radiation~~ by the pump diode.

Please replace the paragraph/section beginning at page 2, line 24, with the following rewritten paragraph:

~~Up until now, all conventional diode pumped solid state lasers arrange the optical resonant cavity within a small inner barrel placed in front of the laser diode assembly to form an "external" resonant cavity. The focusing optics, the Q switch, and/or the single mode device are selectively, as needed, attached to the inner barrel and then installed within a diode laser module along with the laser diode assembly. So, it is thought that if the optical resonant cavity, together with other wanted optics, can be put into within the case casing of the laser diode assembly before the pump diode semiconductor chip, the volume and weight of the whole DPSS laser will thus significantly lowered.~~

Please replace the paragraph/section beginning at page 3, line 2, with the following rewritten paragraph:

A main object of the present invention is to provide a green ~~diode~~ DPSS laser, wherein a volume thereof is substantially smaller than the conventional ones.

Please replace the paragraph/section beginning at page 3, line 4, with the following rewritten paragraph:

Another object of the present invention is to provide a green ~~diode~~ DPSS laser, wherein a weight thereof is substantially less than the conventional ones.

Please add the paragraph/section after line 9 in page 3 as follows:

a semiconductor chip supported by said heat sink for emitting a pumping radiation;

Please replace the paragraph/section beginning at page 3, line 10, with the following rewritten paragraph:

~~a green laser chip comprising a semiconductor chip~~ an optical resonant cavity supported within said laser casing ~~by the heat sink for producing a laser beam~~, including a lasing medium ~~supported within the laser casing~~ to optically communicate with the semiconductor chip for a light amplification of fundamental frequency, and an intracavity frequency doubler ~~mounted~~ to optically communicate with the lasing medium for frequency doubling of the fundamental frequency, wherein an input facet is formed at the lasing medium for the ~~laser beam~~ pumping radiation entering thereinto, an output facet is formed at the intracavity frequency doubler for the ~~laser~~ frequency-doubled beam exiting therefrom, ~~an optical resonant cavity is defined between the inner and output facets;~~

Please replace the paragraph/section beginning at page 3, line 17, with the following rewritten paragraph:

an IR blocking filter inclinedly and sealedly mounted at the second opening end of the laser casing to optically communicate with the output facet of the intracavity frequency doubler; and

Please replace the paragraph/section beginning at page 3, line 19, with the following rewritten paragraph:

a photodiode supported ~~within~~ by the ~~laser casing~~ heat sink at a position that when the ~~laser~~ frequency-doubled beam exits the output ~~facet~~ facet, the IR blocking filter reflects a portion of the ~~laser~~ frequency-doubled beam towards the photodiode such that the photodiode is adapted for detecting the ~~laser~~ frequency-doubled beam from the IR blocking filter as a feedback for controlling a power output of the ~~green laser chip~~ optical resonant cavity.

Please replace the paragraph/section beginning at page 4, line 2, with the following rewritten paragraph:

Figs. 1A and 1B are conventional ~~diode~~ green DPSS laser.

Please replace the paragraph/section beginning at page 5, line 6, with the following rewritten paragraph:

The green diode laser further comprises ~~a green laser chip (GLC) comprising a~~ semiconductor chip 202 supported by the heat sink 201 for ~~producing~~ emitting a laser beam pumping radiation, and ~~a lasing medium 203~~ an optical resonant cavity supported within the laser casing 208. The optical resonant cavity comprises a lasing medium 203 to optically communicate with the semiconductor chip 202 for a light amplification of fundamental frequency, and an intracavity frequency doubler 204 ~~mounted to~~ optically communicate with the lasing medium 203 for frequency doubling of the fundamental frequency, wherein an input facet is formed at the lasing medium 203 for the laser beam pumping radiation entering thereinto, an output facet is formed at the intracavity frequency doubler 204 for the laser frequency-double beam exiting therefrom. ~~as a green laser beam at 532nm, an~~ The optical resonant cavity is defined between the inner and output facets.

Please replace the paragraph/section beginning at page 5, line 14, with the following rewritten paragraph:

The green diode laser further comprises an IR blocking filter 205 inclinedly and sealedly mounted at the second opening end of the laser casing 208 to optically communicate with the output facet, and a photodiode 206 supported within the laser casing 208 at a position that when the laser beam exits the output facet, the IR blocking filter 205 reflects a portion of the laser beam towards the photodiode 206 such that the photodiode 206 is adapted for detecting the laser beam from the IR blocking filter 205 as a feedback for controlling a power output of the ~~green laser chip~~ optical resonant cavity. In other words, the IR blocking filter is inclinedly and sealedly mounted at the second opening end of the laser casing 208 to optically communicate with the output facet of the intracavity frequency doubler 204.

Please replace the paragraph/section beginning at page 5, line 21, with the following rewritten paragraph:

The lasing medium 203 can be, most often, Nd:YAG, ~~or~~ Nd:YVO₄, or Nd:GdVO₄ or another crystal that amplifies the input light that passes through it.

Please replace the paragraph/section beginning at page 5, line 26, with the following rewritten paragraph:

According to the preferred embodiment, the lasing medium 203 and the intracavity frequency doubler 204 are combined together, the input facet of the lasing medium 203 is coated with a coating having a high transmissivity at a wavelength of 808nm ~~anti-reflection layer~~, and a high reflectance at wavelength of 1064nm and 532nm ~~high-reflection layer~~, and a 1064nm high-reflection layer are respectively while the output facet of the intracavity frequency doubler 204 is coated ~~at the input facet. A~~ with a coating having a high transmissivity at a wavelength of 532nm and a high reflectance at a wavelength of 1064nm ~~high-reflection layer and a 532nm anti-reflection layer are respectively coated at the output facet.~~

Please replace the paragraph/section beginning at page 6, line 3, with the following rewritten paragraph:

The photodiode 206 has a light detecting surface for receiving the laser beam from the IR blocking filter 205. The light detecting surface of the photodiode 206 is coated with a coating having a high transmissivity at a wavelength of ~~A 532nm anti-reflection layer~~, and a high reflectance at wavelength of 1064nm ~~a and 808nm high-reflection layer~~, and a 1064nm high-reflection layer are respectively coated on the light detecting surface of the ~~photodiode 206~~. Alternatively, a lens filter having a high transmissivity at a wavelength of 532nm ~~anti-reflection ability~~, and a high reflectance at wavelength of 1064nm and 808nm ~~high-reflection and a 1064nm high-reflection ability can be provided~~ at is covered on the light detecting surface of the photodiode 206.

Please replace the paragraph/section beginning at page 6, line 9, with the following rewritten paragraph:

As shown in Figs. 3A and 3B, a focusing device 303 is mounted between the semiconductor chip 202 and the input facet of the lasing medium 203 for ~~enhancing~~ focusing of the ~~laser beam from the semiconductor chip 202~~ pumping radiation.

Please replace the paragraph/section beginning at page 6, line 12, with the following rewritten paragraph:

As shown in Fig. 4, the lasing medium 203 and the intracavity frequency doubler 204 are spaced with each other, ~~a 808nm anti-reflection layer and a 1064nm high-reflection layer are respectively coated at the input facet of the lasing medium 203 is coated with a coating having a high transmissivity at a wavelength of 808nm and a high reflectance at wavelength of 1064nm and 532nm and a 1064nm anti-reflection layer is coated at the output~~ while a facet of the lasing medium 203 opposite to said input facet is coated with a coating having a high transmissivity at wavelength of 1064nm and 532nm.

Please replace the paragraph/section beginning at page 6, line 15, with the following rewritten paragraph:

~~A 1064nm anti-reflection layer and a 532nm anti-reflection layer are respectively coated at the input facet of the intracavity frequency doubler 204 and a 1064nm high-reflection layer and a 532nm anti-reflection layer are respectively coated at the~~ The output facet of the intracavity frequency doubler 204 is coated with a coating having a high transmissivity at a wavelength of 532nm and a high reflectance at a wavelength of 1064nm while a facet of the intracavity frequency doubler 204 opposite to the output facet is coated with a coating having a high transmissivity at a wavelength of τ . ~~Therefore, when the laser beam from the semiconductor chip 202 enters into the lasing medium 203 as a red laser at 1064nm, a green laser beam at and 532nm is formed and exited from the lasing medium 203.~~

Please replace the paragraph/section beginning at page 6, line 21, with the following rewritten paragraph:

As shown in Fig. 5, ~~an electro-optic crystal 505, which is also known as a Q-switch 505~~ ; is mounted between the ~~semiconductor chip 202~~ intracavity frequency doubler 204 and IR blocking filter 205 within the laser casing 208 for ~~making~~ converting the laser beam into a pulse laser. ~~The infrared (IR) blocking filter 206 can be provided in the path of the laser beam closely neighboring a microlens, either within or out of the~~

~~laser casing 208, for removing the unwanted IR rays while providing excellent transmission for green wavelength. Optically, this IR blocking filter 206 can be dispensed with and the microlens is so made as able to take such a function.~~

Please replace the paragraph/section beginning at page 6, line 28, with the following rewritten paragraph:

As shown in Fig. 6, a single mode device 605 is mounted between the ~~semiconductor chip 202~~ intracavity frequency doubler 204 and the IR blocking filter 205 within the laser casing 208 for converting the laser into a single longitudinal mode laser.

Please replace the paragraph/section beginning at page 7, line 1, with the following rewritten paragraph:

As shown in Fig. 7, when the intracavity frequency doubler 204 is omitted, an infrared light at 1064nm is output. Accordingly, a 808nm anti-reflection layer and a 1064nm high-reflection layer are respectively coated at the input facet of the lasing medium 203 while a 1064nm high-reflection layer is coated at the output facet of the lasing medium 203, an optical resonant cavity is defined between the input and output facets. In addition, a 1064nm anti-reflection layer and a 808nm high reflection layer are respectively coated at the light detecting surface of the photodiode 206. Therefore, the photodiode 206 is adapted for detecting the infrared light from the IR blocking filter 205 as a feedback for controlling a power output of the ~~laser chip~~ optical resonant cavity.

Please replace the paragraph/section beginning at page 7, line 9, with the following rewritten paragraph:

From above disclosure, it could be seen that by installing and supporting the resonant cavity and the necessary optics within the laser casing 208 of an existing ~~green laser chip (GLC)~~ diode (LD), a volume and weight of the present invention will be substantially reduced.